Household and Corporate Debts and the Real Economy

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Motivation

- Before the GFC, most advanced economies (AEs) experienced rapid accumulations of private debts, particularly household debts, which are related to severe economic downturns during the great recession.
- AEs have reduced the levels of private debts after the GFC, but EMEs continue to amass significant amounts of private debts.

Why Private Debts Matter?

- Mian, Sufi and Verner (2017; MSV, hereafter) survey a recent body of theoretical research.
- Depending on the structure of models and nature of the shocks, either positive or negative relationship between private debt buildups and the real economy is possible.
  - Rational-expectations models with credit demand shocks imply a positive relationship.
  - Models based on credit supply shocks explain the rise in private debts during the boom and subsequent downturn of the economy.

On the empirical front

- A majority of studies confirm that financial crisis recessions, followed by rapid buildups of private debts, are more severe relative to normal recessions.
  - Jordà, Schularick and Taylor (2013; JST, hereafter)
  - Claessens, Kose and Terrones (2012)
  - Bernardini and Forni (2017)

What we do here…

- Understanding the impact of both household and corporate debt buildups on the real economy and asset prices in both AEs and EMEs.
- We define financial peaks (FPs) solely based on the accumulation speed of private debts and compare recessions following them with those following normal peaks (NPs).
- We consider financial peaks driven by both household and corporate debts and analyze if there is any difference in recession dynamics after them.

Findings

- We find that, in both AEs and EMEs, the level of household debts is smaller than that of corporate debts, but the former increases slightly faster with less volatility (SD) than the latter.
- We confirm MSV (Mian, Sufi and Verner; 2017)'s results that while buildups of household debts boost output growth in the very short run, they predict lower output growth three or more years later.

Findings

- In contrast, buildups of corporate debts never increase output growth even in the short run, and predict lower output growth in one to three years.
- However, the negative impacts of corporate debts buildups are comparable to those of household debt buildups.
- We also find that approximately half of the impacts are explained by changes in asset prices in AEs, but much more in EMEs.

Findings

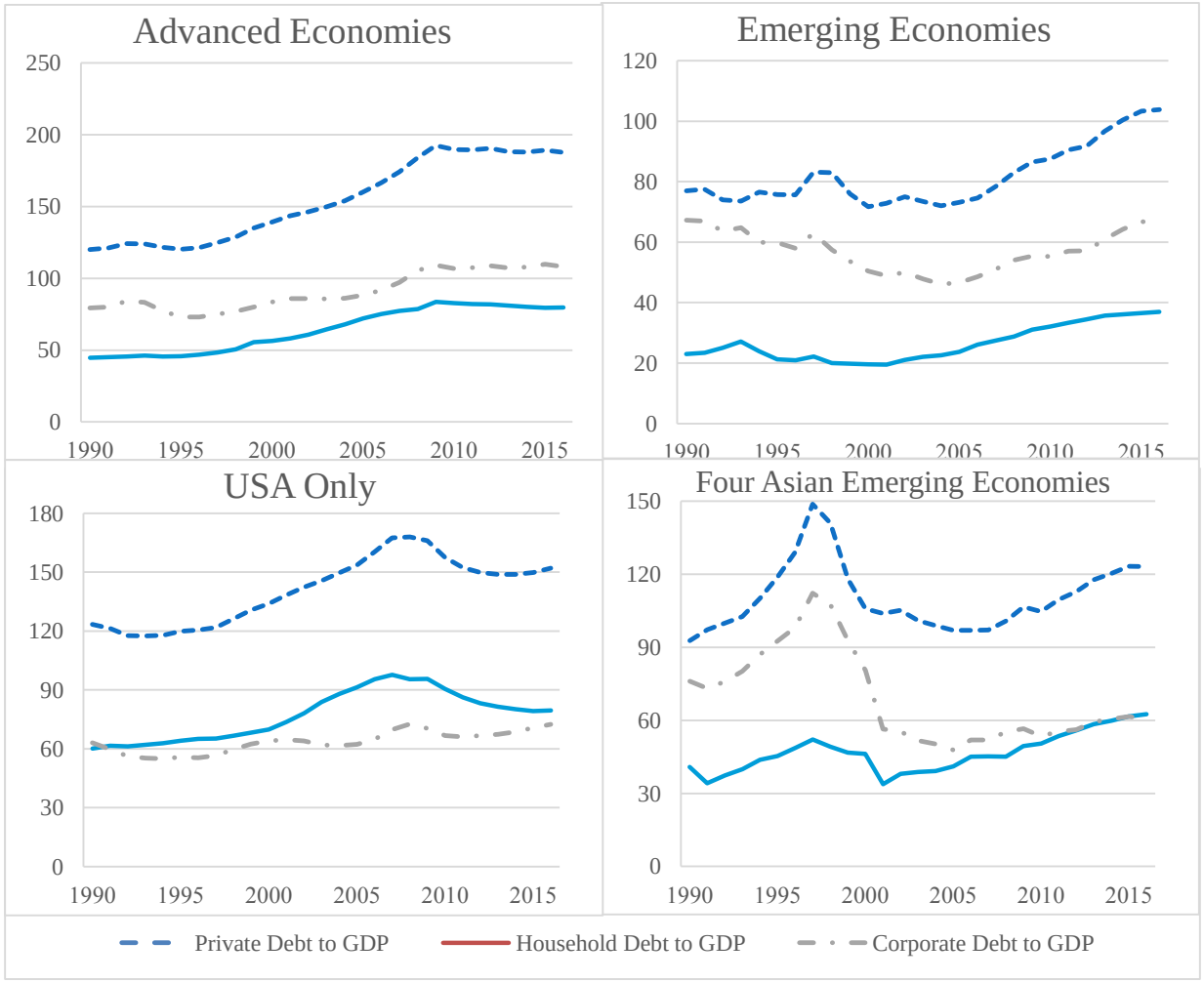
- We find that more FPs are driven by corporate, rather than household, debt buildups in both AEs and EMEs.
- The impact of corporate financial recessions on output is as damaging as in AEs and more damaging in EMEs than that of household financial recessions.
- Higher excess credits, either to households or corporations, from the previous expansion create more painful recession trajectories of output after FPs.

Data

- We collect private debts of nonfinancial sector as share of GDP from the BIS Debt Securities database.
- Private debts of nonfinancial sector are then divided into household debts and non-financial corporate debts for 21 AEs and 17 EMEs from 1990 to 2016.

Advanced Economies	Emerging Economies
Austria	Argentina
Australia	Brazil
Belgium	Colombia
Canada	Czech Republic
Switzerland	Hong Kong SAR
Germany	Hungary
Denmark	Indonesia
Spain	Israel
Finland	Mexico
France	Malaysia
United Kingdom	Poland
Greece	Russia
Ireland	Saudi Arabia
Italy	Singapore
Japan	Thailand
Netherlands	Turkey
Norway	Korea
New Zealand	
Portugal	
Sweden	
United States	

The dynamics of private debts, household debts and corporate debts in AEs and EMEs.



Findings in Figure 1

- While both household and corporate debts increased before the global financial crisis in AEs, the dynamics of household debts is more dramatic.
- Unlike AEs, EMEs continue to accumulate private debts even after the GFC.
- In Asian emerging economies, the increase in private debts is most pronounced before the Asian financial crisis (AFC) in 1997, which is largely driven by corporate debts.

Table 1. Dynamic Correlations between Increases in Household and Corporate Debts

Correlation with Δhhd_t							
	$\Delta corp_{t-3}$	$\Delta corp_{t-2}$	$\Delta corp_{t-1}$	$\Delta corp_t$	$\Delta corp_{t+1}$	$\Delta corp_{t+2}$	$\Delta corp_{t+3}$
Whole Countries	-0.007 (0.23)	0.036 (0.27)	0.105 (0.29)	0.276 (0.29)	0.210 (0.30)	0.228 (0.25)	0.189 (0.23)
Advanced Economies	0.047 (0.19)	0.143 (0.19)	0.213 (0.24)	0.305 (0.26)	0.235 (0.25)	0.264 (0.24)	0.237 (0.20)
Emerging Market Economies	-0.074 (0.25)	-0.095 (0.30)	-0.028 (0.31)	0.240 (0.33)	0.179 (0.36)	0.183 (0.26)	0.130 (0.25)

Table 2. Summary Statistics

Table 2.1. Advanced Economies

	N	Mean	SD	Min	Max	Serial corr.
y_{na}	1364	10.02	0.57	8.04	11.34	
Δy_{na}	1343	2.43	2.82	-9.36	14.72	0.43
y_{output}	1364	9.84	0.63	7.83	11.34	
Δy_{output}	1343	2.87	3.49	-18.07	21.12	0.24
C	1364	9.28	0.58	7.20	10.53	
ΔC	1343	2.59	3.32	-15.21	23.51	0.29
I	1364	8.52	0.68	5.88	10.00	
ΔI	1343	2.95	10.04	-59.77	44.31	0.05
d_{priv}	1135	123.05	51.68	25.60	322.70	
Δd_{priv}	1114	2.17	5.79	-28.80	56.60	0.46
$d_{hh\,d}$	794	55.52	26.96	5.50	139.50	
$\Delta d_{hh\,d}$	773	1.23	2.80	-24.60	11.40	0.60
d_{corp}	776	83.73	31.38	24.80	264.90	
Δd_{corp}	755	1.17	5.39	-25.20	46.50	0.30
Δhp	1144	6.81	9.41	-37.47	98.06	0.57
$\Delta stock$	1269	6.52	24.28	-149.47	102.77	-0.01
Tropen	127	0.65	0.34	0.10	2.10	
$Finopen$	110	2.81	3.39	0.20	26.05	
WorldGR	130	2.47	1.56	-1.74	6.18	

Table 2.2. Emerging Economies

	N	Mean	SD	Min	Max	Serial corr.
y_{na}	927	9.25	0.86	6.79	11.46	
Δy_{na}	910	2.84	4.82	-29.56	29.40	0.34
y_{output}	927	9.06	0.90	6.74	11.10	
Δy_{output}	910	3.34	6.60	-32.90	35.25	0.25
C	927	8.49	0.79	6.38	10.47	
ΔC	910	3.14	5.98	-27.02	33.13	0.23
I	927	7.60	1.14	4.06	10.19	
ΔI	910	3.71	15.16	-70.33	71.54	0.07
d_{priv}	575	76.69	49.93	10.90	301.50	
Δd_{priv}	558	1.83	7.50	-67.60	49.80	0.15
$d_{hh\,d}$	415	25.99	20.71	0.10	92.80	
$\Delta d_{hh\,d}$	398	0.93	2.05	-6.10	9.80	0.46
d_{corp}	415	55.31	34.34	11.40	233.90	
Δd_{corp}	398	0.86	5.34	-20.40	28.00	0.32
Δhp	168	7.68	10.32	-33.17	39.87	0.52
$\Delta stock$	262	10.57	41.07	-237.02	222.37	-0.27
Tropen	72	1.14	1.04	0.15	4.22	
$Finopen$	64	3.19	5.38	0.35	24.28	
WorldGR	72	2.42	1.38	-1.74	4.65	

Findings in Table 2

- The means of private debts, household debts and corporate debts as shares of GDP are higher in AEs than in.
- In both groups, the level of household debts is smaller than that of corporate debts, but the former increases slightly faster than the latter.
- However, the volatility (SD) of percentage points per year (ppy) increases in corporate debts is much higher than that in household debts.

Dynamic relations between private debts and the real economy

- MSV emphasize that household debts are much more related to booms and busts of the economy than corporate debts by estimating the following equation:

$$\Delta_3 y_{it+k} = \beta_0 + \beta_H \Delta_3 d_{it-1}^{HH} + \beta_H \Delta_3 d_{it-1}^{Corp} + u_{it+k}$$

$$k = -1, 0, \ldots, 5$$

Table 3.1 Household- and Corporate-Debt Expansion and Future Three-Year GDP Growth

Advanced Economies

VARIABLES	$\Delta_3 y_{it-1}$	$\Delta_3 y_{it}$	$\Delta_3 y_{it+1}$	$\Delta_3 y_{it+2}$	$\Delta_3 y_{it+3}$	$\Delta_3 y_{it+4}$	$\Delta_3 y_{it+5}$
$\Delta_3 d_{it-1}^{HHD}$	0.196**	0.171**	0.0310	-0.190*	-0.391**	-0.481**	-0.462**
	[0.0595]	[0.0648]	[0.0698]	[0.0817]	[0.0982]	[0.111]	[0.121]
$\Delta_3 d_{it-1}^{Corp}$	-0.0997+	-0.191**	-0.197**	-0.134**	-0.0526	0.0270	0.0897*
	[0.0573]	[0.0568]	[0.0474]	[0.0421]	[0.0425]	[0.0432]	[0.0415]
Observations	671	650	629	608	587	566	545
R^2	0.047	0.106	0.125	0.129	0.175	0.194	0.168
Countries	21	21	21	21	21	21	21
p-value (HHD vs. Corp)	0.00	0.00	0.01	0.58	0.01	0.00	0.00

Emerging Economies

VARIABLES	$\Delta_3 y_{it-1}$	$\Delta_3 y_{it}$	$\Delta_3 y_{it+1}$	$\Delta_3 y_{it+2}$	$\Delta_3 y_{it+3}$	$\Delta_3 y_{it+4}$	$\Delta_3 y_{it+5}$
$\Delta_3 d_{it-1}^{HHD}$	0.256	0.0787	-0.115	-0.262**	-0.345**	-0.352**	-0.301+
	[0.232]	[0.197]	[0.128]	[0.0644]	[0.0668]	[0.107]	[0.156]
$\Delta_3 d_{it-1}^{Corp}$	-0.0419	-0.123+	-0.147*	-0.116*	-0.0825	-0.0382	-0.0113
	[0.0846]	[0.0745]	[0.0615]	[0.0558]	[0.0628]	[0.0673]	[0.0748]
Observations	330	313	296	279	262	244	228
R^2	0.025	0.034	0.074	0.087	0.090	0.073	0.053
Countries	17	17	17	17	17	16	16
p-value (HHD vs. Corp)	0.32	0.43	0.84	0.06	0.01	0.04	0.17

Table 3.2 Household- and Corporate-Debt Expansion and Future Three-Year Consumption Growth

Advanced Economies

VARIABLES	$\Delta_3 c_{it-1}$	$\Delta_3 c_{it}$	$\Delta_3 c_{it+1}$	$\Delta_3 c_{it+2}$	$\Delta_3 c_{it+3}$	$\Delta_3 c_{it+4}$	$\Delta_3 c_{it+5}$
$\Delta_3 d_{it-1}^{HHD}$	0.225**	0.216**	0.107	-0.0872	-0.306**	-0.439**	-0.457**
	[0.0824]	[0.0829]	[0.0698]	[0.0602]	[0.0801]	[0.105]	[0.118]
$\Delta_3 d_{it-1}^{Corp}$	-0.0319	-0.165*	-0.222**	-0.171**	-0.0717	0.0366	0.127*
	[0.0629]	[0.0692]	[0.0663]	[0.0618]	[0.0552]	[0.0495]	[0.0509]
Observations	671	650	629	608	587	566	545
R^2	0.037	0.062	0.105	0.095	0.099	0.120	0.129
Countries	21	21	21	21	21	21	21
p-value (HHD vs. Corp)	0.05	0.00	0.00	0.29	0.01	0.00	0.00

Emerging Economies

VARIABLES	$\Delta_3 c_{it-1}$	$\Delta_3 c_{it}$	$\Delta_3 c_{it+1}$	$\Delta_3 c_{it+2}$	$\Delta_3 c_{it+3}$	$\Delta_3 c_{it+4}$	$\Delta_3 c_{it+5}$
$\Delta_3 d_{it-1}^{HHD}$	0.0948	-0.0752	-0.216	-0.306+	-0.248	-0.183	-0.101
	[0.260]	[0.228]	[0.176]	[0.162]	[0.170]	[0.146]	[0.134]
$\Delta_3 d_{it-1}^{Corp}$	0.0321	-0.0635	-0.0694	-0.0382	-0.0168	-0.00998	-0.0150
	[0.122]	[0.135]	[0.123]	[0.106]	[0.103]	[0.0900]	[0.0711]
Observations	330	313	296	279	262	244	228
R^2	0.004	0.007	0.020	0.026	0.016	0.009	0.004
Countries	17	17	17	17	17	16	16
p-value (HHD vs. Corp)	0.86	0.97	0.54	0.09	0.10	0.25	0.63

Table 3.3 Household- and Corporate-Debt Expansion and Future Three-Year Investment Growth

Advanced Economies

VARIABLES	$\Delta_3 i_{it-1}$	$\Delta_3 i_{it}$	$\Delta_3 i_{it+1}$	$\Delta_3 i_{it+2}$	$\Delta_3 i_{it+3}$	$\Delta_3 i_{it+4}$	$\Delta_3 i_{it+5}$
$\Delta_3 d_{it-1}^{HHD}$	0.836**	0.823**	0.309	-0.445+	-1.079**	-1.208**	-0.939**
	[0.227]	[0.214]	[0.222]	[0.257]	[0.283]	[0.274]	[0.270]
$\Delta_3 d_{it-1}^{Corp}$	-0.377*	-0.700**	-0.612**	-0.263+	0.0979	0.318**	0.402**
	[0.179]	[0.154]	[0.146]	[0.145]	[0.124]	[0.114]	[0.126]
Observations	671	650	629	608	587	566	545
R^2	0.084	0.163	0.119	0.063	0.106	0.127	0.096
Countries	21	21	21	21	21	21	21
p-value (HHD vs. Corp)	0.00	0.00	0.00	0.58	0.00	0.00	0.00

Emerging Economies

VARIABLES	$\Delta_3 i_{it-1}$	$\Delta_3 i_{it}$	$\Delta_3 i_{it+1}$	$\Delta_3 i_{it+2}$	$\Delta_3 i_{it+3}$	$\Delta_3 i_{it+4}$	$\Delta_3 i_{it+5}$
$\Delta_3 d_{it-1}^{HHD}$	1.075+	0.343	-0.430	-0.778**	-0.868*	-0.848**	-0.816**
	[0.568]	[0.496]	[0.401]	[0.299]	[0.383]	[0.259]	[0.142]
$\Delta_3 d_{it-1}^{Corp}$	-0.124	-0.504*	-0.667**	-0.599**	-0.444*	-0.216	-0.0147
	[0.247]	[0.236]	[0.223]	[0.199]	[0.180]	[0.170]	[0.206]
Observations	330	313	296	279	262	244	228
R^2	0.033	0.043	0.106	0.112	0.083	0.046	0.030
Countries	17	17	17	17	17	16	16
p-value (HHD vs. Corp)	0.07	0.19	0.65	0.60	0.21	0.01	0.01

Table 3.4 Household- and Corporate-Debt Expansion and Future Three-Year Housing-Price Growth

Advanced Economies

VARIABLES	$\Delta_3 \text{hp}_{it-1}$	$\Delta_3 hp_{it}$	$\Delta_3 hp_{it+1}$	$\Delta_3 hp_{it+2}$	$\Delta_3 hp_{it+3}$	$\Delta_3 hp_{it+4}$	$\Delta_3 hp_{it+5}$
$\Delta_3 d_{it-1}^{HHD}$	1.116**	0.977**	0.523*	-0.0669	-0.765**	-1.281**	-1.574**
	[0.237]	[0.214]	[0.211]	[0.255]	[0.286]	[0.279]	[0.269]
$\Delta_3 d_{it-1}^{Corp}$	-0.110	-0.343	-0.426*	-0.402*	-0.264*	-0.0954	0.0891
	[0.206]	[0.227]	[0.206]	[0.162]	[0.133]	[0.133]	[0.126]
Observations	627	610	593	576	558	540	521
R^2	0.118	0.079	0.047	0.048	0.086	0.138	0.175
Countries	21	21	21	21	21	21	21
p-value (HHD vs. Corp)	0.00	0.00	0.00	0.27	0.13	0.00	0.00

Emerging Economies

VARIABLES	$\Delta_3 \text{hp}_{it-1}$	$\Delta_3 hp_{it}$	$\Delta_3 hp_{it+1}$	$\Delta_3 hp_{it+2}$	$\Delta_3 hp_{it+3}$	$\Delta_3 hp_{it+4}$	$\Delta_3 hp_{it+5}$
$\Delta_3 d_{it-1}^{HHD}$	0.0197	-0.341	-0.872	-1.310	-1.566*	-1.610**	-1.341**
	[0.410]	[0.611]	[0.787]	[0.797]	[0.682]	[0.517]	[0.327]
$\Delta_3 d_{it-1}^{Corp}$	0.550*	0.406	0.240	0.0543	-0.0460	-0.00216	0.0700
	[0.222]	[0.383]	[0.448]	[0.340]	[0.150]	[0.0816]	[0.0632]
Observations	115	111	107	103	99	94	91
R^2	0.133	0.070	0.058	0.108	0.163	0.167	0.111
Countries	8	8	8	8	8	7	7
p-value (HHD vs. Corp)	0.36	0.45	0.35	0.18	0.03	0.00	0.00

Table 3.5 Household- and Corporate-Debt Expansion and Future Three-Year Stock-Price Growth

Advanced Economies

VARIABLES	$\Delta_3 st_{it-1}$	$\Delta_3 st_{it}$	$\Delta_3 st_{it+1}$	$\Delta_3 st_{it+2}$	$\Delta_3 st_{it+3}$	$\Delta_3 st_{it+4}$	$\Delta_3 st_{it+5}$
$\Delta_3 d_{it-1}^{HHD}$	0.697	0.107	-0.967	-2.239**	-2.602**	-2.269**	-1.373*
	[0.534]	[0.560]	[0.758]	[0.869]	[0.791]	[0.658]	[0.573]
$\Delta_3 d_{it-1}^{Corp}$	-1.346**	-1.414**	-1.062**	-0.348	0.273	0.887**	1.033**
	[0.424]	[0.361]	[0.395]	[0.406]	[0.372]	[0.292]	[0.375]
Observations	658	638	618	598	578	558	538
R^2	0.076	0.098	0.095	0.098	0.089	0.077	0.057
Countries	21	21	21	21	21	21	21
p-value (HHD vs. Corp)	0.01	0.05	0.93	0.11	0.01	0.00	0.00

Emerging Economies

VARIABLES	$\Delta_3 st_{it-1}$	$\Delta_3 st_{it}$	$\Delta_3 st_{it+1}$	$\Delta_3 st_{it+2}$	$\Delta_3 st_{it+3}$	$\Delta_3 st_{it+4}$	$\Delta_3 st_{it+5}$
$\Delta_3 d_{it-1}^{HHD}$	0.622	-0.625	-1.971*	-2.728+	-2.680	-2.126*	-1.520
	[1.404]	[0.839]	[0.840]	[1.450]	[1.657]	[1.046]	[0.995]
$\Delta_3 d_{it-1}^{Corp}$	-1.328*	-1.005+	-0.469	-0.340	-0.337	-0.533+	-0.0779
	[0.606]	[0.573]	[0.492]	[0.285]	[0.276]	[0.311]	[0.448]
Observations	166	160	153	146	139	131	125
R^2	0.081	0.060	0.051	0.073	0.070	0.061	0.021
Countries	9	9	9	9	9	8	8
p-value (HHD vs. Corp)	0.27	0.75	0.04	0.07	0.18	0.17	0.24

Findings in Table 3

- We confirm MSV's results for AEs: buildups of household debts are more related to boom and bust of GDP.
- While the size of estimated coefficients of corporate debts are smaller, their negative impacts are comparable to household debts: one SD ppy increase in household and corporate debts lowers future output growth by 1.34 % and 1.06 %, respectively.
- In EMEs, the coefficients show the same pattern, but the magnitude of the negative impact is larger for corporate debts, which is mainly due to their larger volatility.

Findings in Table 3 (cont.)

- For consumption growth, we observe the same pattern in AEs.
- In EMEs, no coefficient is statistically significant.
- On investment growth, corporate debts have more negative impacts than household debts and this feature is more pronounced in EMEs.

Findings in Table 3 (cont.)

- In AEs, household debts lead to similar booms and busts of housing prices, but corporate debts have only negative impacts on housing prices.
- In EMEs, household debts have only negative impacts on housing prices in the medium run and corporate debts have almost no impacts.
- On stock prices, both household and corporate debts exhibit negative prediction in both AEs and EMEs.

Advanced Economies

VARIABLES	$\Delta_3 y_{it-1}$	$\Delta_3 y_{it}$	$\Delta_3 y_{it+1}$	$\Delta_3 y_{it+2}$	$\Delta_3 y_{it+3}$	$\Delta_3 y_{it+4}$	$\Delta_3 y_{it+5}$
$\Delta_3 d_{it-1}^{HHD}$	-0.0174	0.00616	-0.0271	-0.0924	-0.186*	-0.222*	-0.219**
	[0.0532]	[0.0465]	[0.0474]	[0.0624]	[0.0764]	[0.0879]	[0.0834]
$\Delta_3 d_{it-1}^{Corp}$	-0.0248	-0.0853*	-0.0979**	-0.0695*	-0.0309	0.000970	0.0415
	[0.0369]	[0.0397]	[0.0332]	[0.0342]	[0.0354]	[0.0328]	[0.0270]
$\Delta_3 hp_{it-k}$	0.158**	0.152**	0.146**	0.142**	0.131**	0.125**	0.124**
	[0.0268]	[0.0261]	[0.0263]	[0.0260]	[0.0250]	[0.0239]	[0.0209]
$\Delta_3 st_{it-k}$	0.0375**	0.0345**	0.0339**	0.0342**	0.0350**	0.0368**	0.0399**
	[0.00831]	[0.00846]	[0.00850]	[0.00851]	[0.00802]	[0.00723]	[0.00743]
Observations	623	606	589	572	554	536	517
R^2	0.443	0.464	0.478	0.476	0.483	0.475	0.465
Countries	21	21	21	21	21	21	21
p-value (HHD vs. Corp)	0.92	0.19	0.25	0.78	0.12	0.04	0.01

Emerging Economies

VARIABLES	$\Delta_3 y_{it-1}$	$\Delta_3 y_{it}$	$\Delta_3 y_{it+1}$	$\Delta_3 y_{it+2}$	$\Delta_3 y_{it+3}$	$\Delta_3 y_{it+4}$	$\Delta_3 y_{it+5}$
$\Delta_3 d_{it-1}^{HHD}$	-0.0583	-0.101	-0.122	-0.0737	0.00308	0.111	0.148
	[0.227]	[0.181]	[0.0960]	[0.0641]	[0.145]	[0.172]	[0.165]
$\Delta_3 d_{it-1}^{Corp}$	0.0297	-0.0821*	-0.111	-0.100	-0.0701	-0.0391	-0.0233
	[0.0679]	[0.0385]	[0.0705]	[0.0884]	[0.0863]	[0.0656]	[0.0529]
$\Delta_3 hp_{it+k}$	0.135*	0.173**	0.161**	0.135**	0.133**	0.150**	0.144**
	[0.0527]	[0.0445]	[0.0330]	[0.0235]	[0.0275]	[0.0232]	[0.0246]
$\Delta_3 st_{it+k}$	0.0340*	0.0261**	0.0196**	0.0224*	0.0269*	0.0246**	0.0217**
	[0.0146]	[0.00946]	[0.00731]	[0.00963]	[0.0114]	[0.00791]	[0.00580]
Observations	108	105	101	97	93	88	85
R^2	0.263	0.296	0.304	0.283	0.245	0.227	0.225
Countries	8	8	8	8	8	7	7
p-value (HHD vs. Corp)	0.73	0.92	0.95	0.86	0.67	0.40	0.40

Are asset prices one of the channels through which private debts have impacts?

- We add changes in asset prices such as housing and stock prices as additional regressors.
- While the estimated coefficients of household and corporate debts are lowered approximately by halves, they are still statistically significant with the same pattern.
- Interestingly, however, in EMEs, all coefficients of household and corporate debts become statistically insignificant.

Normal vs. Financial Peaks

- We use the Hodrick-Prescott filter to extract business cycle fluctuations.
  - cf. the Bry-Boschan algorithm
- We find total of 195 peaks and 140 peaks in AEs and EMEs, respectively.
- We define financial peaks (FPs) solely based on buildup speed of private debts.
  - We calculate annual change in private debts in the preceding expansion, and if it is higher than the median in the sample, the corresponding peak is defined as a FP and otherwise as a NP.

Household vs. Corporate FPs

- We divide FPs into household-debt driven and corporate-debt driven peaks by comparing annual changes in household debts and corporate debts in the preceding expansion.
- Out of 98 FPs, we have both household and corporate debts data in 66 cases, and they are divided into 20 (6) household FPs and 24 (14) corporate FPs in AEs (EMEs).

Cumulative response of recessions

- Following JST, we estimate the following unconditional path of the cumulative response of the variable y to a treatment x at time t(r):

$$\mathrm{CR}\left(\Delta_h y_{it(r)+h}, \delta\right) = E_{it(r)}\left(\Delta_h y_{it(r)+h} \middle| x_{it(r)} = \bar{x} + \delta\right)$$
$$- E_{it(r)}\left(\Delta_h y_{it(r)+h} \middle| x_{it(r)} = \bar{x}\right), \mathrm{h} = 1, .., \mathrm{H}$$

where $\mathrm{CR}\left(\Delta_h y_{it(r)+h}, \delta\right)$ denotes the average cumulated response of y across countries and recessions, *h* periods in the future, with the treatment variable x of given a size δ change.

Table 6. Recession Paths of GDP, Consumption and Investment after Normal and Financial Peaks

Table 6.1 Advanced Economies

VARIABLES	$\Delta_1 y_{it+1}$	$\Delta_2 y_{it+2}$	$\Delta_3 y_{it+3}$	$\Delta_4 y_{it+4}$	$\Delta_5 y_{it+5}$
Normal Peak	0.481+	1.397**	2.992**	5.275**	7.833**
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[0.255]	[0.514]	[0.680]	[0.870]	[1.017]
Financial Peak	-0.177	-0.852+	0.316	1.819*	2.940**
$(\Delta d_{priv} > median(\Delta d_{priv}))$	[0.229]	[0.462]	[0.612]	[0.783]	[0.915]
R^2	0.036	0.088	0.149	0.273	0.383
F-test equality of coefficients, normal = financial (p)	0.06	0.00	0.00	0.00	0.00
N Normal Peaks	51.00	51.00	51.00	51.00	51.00
N Financial Peaks	63.00	63.00	63.00	63.00	63.00

VARIABLES	$\Delta_1 c_{it+1}$	$\Delta_2 c_{it+2}$	$\Delta_3 c_{it+3}$	$\Delta_4 c_{it+4}$	$\Delta_5 c_{it+5}$
Normal Peak	0.831+	1.608*	2.797**	4.959**	7.485**
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[0.434]	[0.618]	[0.892]	[1.089]	[1.206]
Financial Peak	1.729**	1.681**	2.627**	4.488**	6.784**
$(\Delta d_{priv} > median(\Delta d_{priv}))$	[0.391]	[0.556]	[0.803]	[0.980]	[1.085]
R^2	0.172	0.125	0.155	0.271	0.409
F-test equality of coefficients, normal = financial (p)	0.13	0.93	0.89	0.75	0.67
Observations, Normal Peaks	51.00	51.00	51.00	51.00	51.00
Observations, Financial Peaks	63.00	63.00	63.00	63.00	63.00

VARIABLES	$\Delta_1 i_{it+1}$	$\Delta_2 i_{it+2}$	$\Delta_3 i_{it+3}$	$\Delta_4 i_{it+4}$	$\Delta_5 i_{it+5}$
Normal Peak	-3.054**	-5.147**	-4.349*	-1.477	2.100
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[1.154]	[1.877]	[2.158]	[2.656]	[2.895]
Financial Peak	-4.213**	-11.09**	-8.528**	-5.294*	-3.442
$(\Delta d_{priv} > median(\Delta d_{priv}))$	[1.038]	[1.689]	[1.942]	[2.390]	[2.605]
R^2	0.173	0.311	0.173	0.045	0.020
F-test equality of coefficients, normal = financial (p)	0.46	0.02	0.15	0.29	0.16
Observations, Normal Peaks	51.00	51.00	51.00	51.00	51.00
Observations, Financial Peaks	63.00	63.00	63.00	63.00	63.00

Table 6.2 Whole Countries

VARIABLES	$\Delta_1 y_{it+1}$	$\Delta_2 y_{it+2}$	$\Delta_3 y_{it+3}$	$\Delta_4 y_{it+4}$	$\Delta_5 y_{it+5}$
Normal Peak	.3406	1.718**	4.505**	7.245**	10.26**
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[0.328]	[0.514]	[0.685]	[0.879]	[1.014]
Financial Peak	-0.557+	-1.122*	0.804	2.632**	4.521**
$(\Delta d_{priv} > median(\Delta d_{priv}))$	[0.309]	[0.484]	[0.646]	[0.828]	[0.956]
R^2	0.025	0.090	0.211	0.317	0.426
F-test equality of coefficients, normal = financial (p)	0.05	0.00	0.00	0.00	0.00
N Normal Peaks	80.00	80.00	80.00	80.00	80.00
N Financial Peaks	90.00	90.00	90.00	90.00	90.00

VARIABLES	$\Delta_1 c_{it+1}$	$\Delta_2 c_{it+2}$	$\Delta_3 c_{it+3}$	$\Delta_4 c_{it+4}$	$\Delta_5 c_{it+5}$
Normal Peak	1.716**	2.947**	5.477**	8.040**	11.35**
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[0.516]	[0.776]	[1.016]	[1.285]	[1.453]
Financial Peak	1.098*	1.142	3.382**	6.282**	9.438**
$(\Delta d_{priv} > median(\Delta d_{priv}))$	[0.487]	[0.731]	[0.958]	[1.212]	[1.370]
R^2	0.088	0.091	0.198	0.282	0.392
F-test equality of coefficients, normal = financial (p)	0.38	0.09	0.14	0.32	0.34
Observations, Normal Peaks	80.00	80.00	80.00	80.00	80.00
Observations, Financial Peaks	90.00	90.00	90.00	90.00	90.00

VARIABLES	$\Delta_1 i_{it+1}$	$\Delta_2 i_{it+2}$	$\Delta_3 i_{it+3}$	$\Delta_4 i_{it+4}$	$\Delta_5 i_{it+5}$
Normal Peak	-2.064	-3.308	-0.522	3.622	7.528**
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[1.533]	[2.011]	[2.289]	[2.672]	[2.887]
Financial Peak	-6.617**	-13.81**	-9.963**	-7.091**	-3.841
$(\Delta d_{priv} > median(\Delta d_{priv}))$	[1.445]	[1.896]	[2.158]	[2.520]	[2.722]
R^2	0.119	0.249	0.113	0.055	0.050
F-test equality of coefficients, normal = financial (p)	0.03	0.00	0.00	0.00	0.00
Observations, Normal Peaks	80.00	80.00	80.00	80.00	80.00
Observations, Financial Peaks	90.00	90.00	90.00	90.00	90.00

Findings in Table 6

- Table 6 compares recession paths of cumulative changes in output, consumption and investment, 1-5 years.
  - treating x as a binary indicator for normal or financial recession.
- We find that cumulative changes in output and investment are lower after FPs than after NPs with high statistical significance.
- This is more so in EMEs.

Household vs. Corporate FPs

- We divide FPs into household-debt driven and corporate-debt driven peaks by comparing annual changes in household debts and corporate debts in the preceding expansion.
- Out of 98 FPs, we have both household and corporate debts data in 66 cases, and they are divided into 20 (6) household FPs and 24 (14) corporate FPs in AEs (EMEs).

Table 7. Recession Paths of GDP

Table 7.1 Advanced Economies

VARIABLES	$\Delta_1 y_{it+1}$	$\Delta_2 y_{it+2}$	$\Delta_3 y_{it+3}$	$\Delta_4 y_{it+4}$	$\Delta_5 y_{it+5}$
Normal Peak	0.481+	1.397**	2.992**	5.275**	7.833**
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[0.251]	[0.502]	[0.662]	[0.858]	[1.026]
Household Financial Peak	0.152	-1.238	-1.007	-0.0390	1.389
$(\Delta d_{corp} < \Delta d_{hhd})$	[0.411]	[0.823]	[1.084]	[1.405]	[1.681]
Corporation Financial Peak	-0.830*	-1.402+	0.473	2.067	2.850+
$(\Delta d_{hhd} < \Delta d_{corp})$	[0.374]	[0.748]	[0.985]	[1.277]	[1.528]
R^2	0.088	0.130	0.193	0.310	0.410
F-test equality of coefficients, normal = household (p)	0.50	0.01	0.00	0.00	0.00
F-test equality of coefficients, normal = corporate (p)	0.00	0.00	0.04	0.04	0.01
F-test equality of coefficients, Household = corporate (p)	0.08	0.88	0.31	0.27	0.52
Observations, Normal Peaks	51.00	51.00	51.00	51.00	51.00
Observations, Household Financial Peaks	19.00	19.00	19.00	19.00	19.00
Observations, Corporate Financial Peaks	23.00	23.00	23.00	23.00	23.00

Table 7.2 Whole Countries

Normal Peak	0.346	1.718**	4.505**	7.245**	10.26**
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[0.280]	[0.479]	[0.647]	[0.849]	[1.008]
Household Financial Peak	0.384	-0.794	0.0467	1.611	3.140
$(\Delta d_{corp} < \Delta d_{hhd})$	[0.534]	[0.914]	[1.234]	[1.619]	[1.921]
Corporation Financial Peak	-0.470	-0.888	1.595	3.309*	4.670**
$(\Delta d_{hhd} < \Delta d_{corp})$	[0.430]	[0.735]	[0.992]	[1.302]	[1.545]
R^2	0.024	0.102	0.277	0.376	0.465
F-test equality of coefficients, normal = household (p)	0.95	0.02	0.00	0.00	0.00
F-test equality of coefficients, normal = corporate (p)	0.11	0.00	0.02	0.01	0.00
F-test equality of coefficients, Household = corporate (p)	0.22	0.94	0.33	0.42	0.54
Observations, Normal Peaks	80.00	80.00	80.00	80.00	80.00
Observations, Household Financial Peaks	22.00	22.00	22.00	22.00	22.00
Observations, Corporate Financial Peaks	34.00	34.00	34.00	34.00	34.00

Table 7. Recession Paths of Investment

Table 7.1 Advanced Economies

VARIABLES	$\Delta_1 i_{it+1}$	$\Delta_2 i_{it+2}$	$\Delta_3 i_{it+3}$	$\Delta_4 i_{it+4}$	$\Delta_5 i_{it+5}$
Normal Peak	-3.054**	-5.147**	-4.349*	-1.477	2.100
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[1.121]	[1.723]	[2.063]	[2.581]	[2.984]
Household Financial Peak	-3.631+	-12.84**	-12.85**	-10.98*	-7.507
$(\Delta d_{corp} < \Delta d_{hhd})$	[1.836]	[2.824]	[3.380]	[4.229]	[4.889]
Corporation Financial Peak	-4.897**	-11.08**	-5.724+	-1.134	-0.201
$(\Delta d_{hhd} < \Delta d_{corp})$	[1.669]	[2.566]	[3.072]	[3.844]	[4.443]
R^2	0.181	0.349	0.199	0.074	0.031
F-test equality of coefficients, normal = household (p)	0.79	0.02	0.03	0.06	0.10
F-test equality of coefficients, normal = corporate (p)	0.36	0.06	0.71	0.94	0.67
F-test equality of coefficients, Household = corporate (p)	0.61	0.65	0.12	0.09	0.27
Observations, Normal Peaks	51.00	51.00	51.00	51.00	51.00
Observations, Household Financial Peaks	19.00	19.00	19.00	19.00	19.00
Observations, Corporate Financial Peaks	23.00	23.00	23.00	23.00	23.00

Table 7.2 Whole Countries

Normal Peak	0.346	1.718**	4.505**	7.245**	10.26**
$(\Delta d_{priv} < median(\Delta d_{priv}))$	[0.280]	[0.479]	[0.647]	[0.849]	[1.008]
Household Financial Peak	0.384	-0.794	0.0467	1.611	3.140
$(\Delta d_{corp} < \Delta d_{hhd})$	[0.534]	[0.914]	[1.234]	[1.619]	[1.921]
Corporation Financial Peak	-0.470	-0.888	1.595	3.309*	4.670**
$(\Delta d_{hhd} < \Delta d_{corp})$	[0.430]	[0.735]	[0.992]	[1.302]	[1.545]
R^2	0.024	0.102	0.277	0.376	0.465
F-test equality of coefficients, normal = household (p)	0.95	0.02	0.00	0.00	0.00
F-test equality of coefficients, normal = corporate (p)	0.11	0.00	0.02	0.01	0.00
F-test equality of coefficients, Household = corporate (p)	0.22	0.94	0.33	0.42	0.54
Observations, Normal Peaks	80.00	80.00	80.00	80.00	80.00
Observations, Household Financial Peaks	22.00	22.00	22.00	22.00	22.00
Observations, Corporate Financial Peaks	34.00	34.00	34.00	34.00	34.00

Figure 2A. Advanced Countries

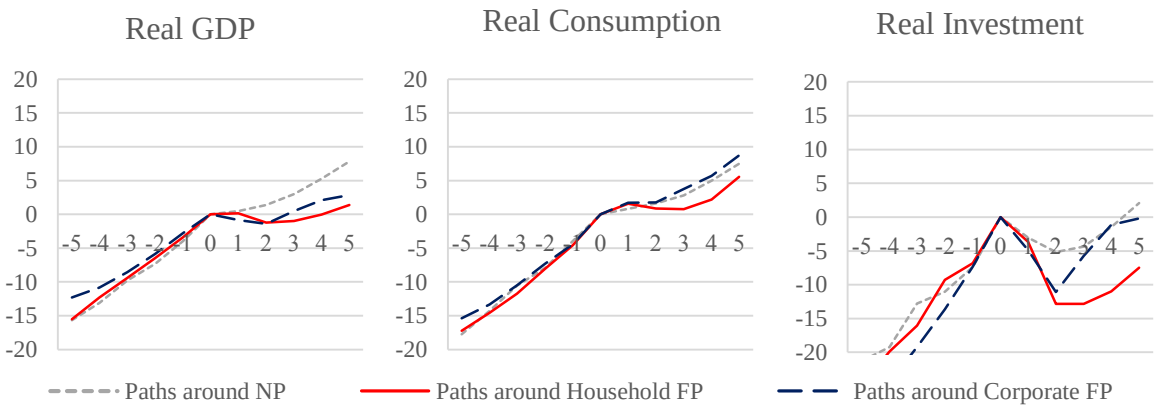
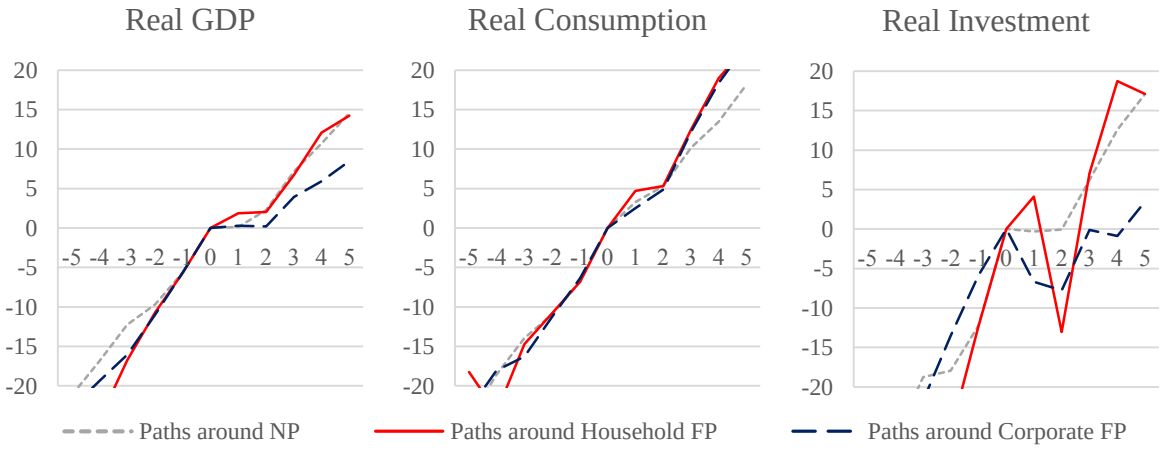


Figure 2B. Emerging Countries



Findings in Table 7

- Cumulative changes in output are substantially lower in both household and corporate financial recessions than in normal recessions.
- However, the difference of cumulative changes in output between household and corporate financial recessions is not statistically significant.
- Corporate financial recessions are equally damaging as household financial recessions is even more strengthened if we include EMEs in the sample.

Excess Credit as a Continuous Treatment

- We include interaction terms with excess credits to households and corporations in the expansion to capture marginal treatment responses due to deviations of excess credit from its specific recession-type mean.

$$(\text{NP} \times (\xi^{H} - \overline{\xi^{H}_{NP}})) \text{ and } (\text{NP} \times (\xi^{C} - \overline{\xi^{C}_{NP}}))$$

$$(\text{FP} \times (\xi^{H} - \overline{\xi^{H}_{FP}})) \text{ and } (\text{FP} \times (\xi^{C} - \overline{\xi^{C}_{FP}}))$$

Table 8.1.A. Recession Paths of GDP

Table 8.1.A. Advanced Economies, Output

VARIABLES	$\Delta_1 y_{it+1}$	$\Delta_1 y_{it+1}$	$\Delta_2 y_{it+2}$	$\Delta_2 y_{it+2}$	$\Delta_3 y_{it+3}$	$\Delta_3 y_{it+3}$	$\Delta_4 y_{it+4}$	$\Delta_4 y_{it+4}$	$\Delta_5 y_{it+5}$	$\Delta_5 y_{it+5}$
Normal Peak	0.0403	0.216	0.693	0.672	1.795*	2.048*	3.647**	3.882**	5.678**	5.682**
	[0.403]	[0.442]	[0.705]	[0.773]	[0.875]	[1.020]	[1.130]	[1.326]	[1.280]	[1.475]
Financial Peak	-0.394	-0.381	-1.222*	-1.371*	-0.00746	-0.381	1.366	0.873	2.491*	1.817+
	[0.310]	[0.314]	[0.543]	[0.549]	[0.673]	[0.724]	[0.869]	[0.942]	[0.985]	[1.047]
Household Excess credit × Normal Peak	0.00185		-0.140		-0.819		-0.773		-0.668	
	[0.266]		[0.464]		[0.576]		[0.744]		[0.843]	
Household Excess credit × Financial Peak	0.0525		-0.676*		-1.211**		-1.614**		-1.936**	
	[0.187]		[0.327]		[0.406]		[0.524]		[0.594]	
Corporation Excess credit × Normal Peak		-0.0229		0.266		-0.0547		-0.263		-0.230
		[0.186]		[0.326]		[0.429]		[0.558]		[0.621]
Corporation Excess credit × Financial Peak		-0.220		-0.799*		-0.962*		-1.166*		-1.529*
		[0.177]		[0.310]		[0.409]		[0.532]		[0.591]
R^2	0.025	0.050	0.154	0.197	0.203	0.146	0.273	0.201	0.370	0.307
F-test equality of coefficients, normal = financial (p)	0.40	0.28	0.04	0.04	0.11	0.06	0.11	0.07	0.05	0.04
F-test equality of coefficients, interaction terms (p)	0.88	0.45	0.35	0.02	0.58	0.13	0.36	0.25	0.22	0.14
Observations, Normal Peaks	25.00	23.00	25.00	23.00	25.00	23.00	25.00	23.00	25.00	23.00
Observations, Financial Peaks	42.00	40.00	42.00	40.00	42.00	40.00	42.00	40.00	42.00	40.00

Table 8.2.A. Whole Countries, Output

VARIABLES	$\Delta_1 y_{it+1}$	$\Delta_1 y_{it+1}$	$\Delta_2 y_{it+2}$	$\Delta_2 y_{it+2}$	$\Delta_3 y_{it+3}$	$\Delta_3 y_{it+3}$	$\Delta_4 y_{it+4}$	$\Delta_4 y_{it+4}$	$\Delta_5 y_{it+5}$	$\Delta_5 y_{it+5}$
Normal Peak	0.112	0.197	1.068	1.177+	3.990**	4.115**	6.473**	6.531**	9.040**	9.026**
	[0.412]	[0.425]	[0.662]	[0.677]	[0.869]	[0.899]	[1.145]	[1.190]	[1.328]	[1.378]
Financial Peak	-0.135	-0.109	-0.851	-0.817	0.987	0.953	2.642*	2.591*	4.069**	3.957**
	[0.374]	[0.384]	[0.600]	[0.611]	[0.788]	[0.812]	[1.038]	[1.074]	[1.204]	[1.244]
Household Excess credit × Normal Peak	0.118		0.333		-0.299		-0.0914		0.186	
	[0.282]		[0.453]		[0.595]		[0.784]		[0.909]	
Household Excess credit × Financial Peak	0.0770		-0.0452		-0.430		-0.601		-0.728	
	[0.190]		[0.305]		[0.401]		[0.528]		[0.612]	
Corporation Excess credit × Normal Peak		-0.120		-0.0338		-0.200		-0.300		-0.211
		[0.149]		[0.237]		[0.315]		[0.416]		[0.482]
Corporation Excess credit × Financial Peak		-0.0105		-0.540		-0.494		-0.596		-0.876
		[0.207]		[0.330]		[0.438]		[0.580]		[0.672]
R^2	0.005	0.010	0.050	0.074	0.197	0.203	0.289	0.285	0.377	0.369
F-test equality of coefficients, normal = financial (p)	0.66	0.59	0.03	0.03	0.01	0.01	0.01	0.02	0.01	0.01
F-test equality of coefficients, interaction terms (p)	0.91	0.67	0.49	0.22	0.86	0.59	0.59	0.68	0.41	0.42
Observations, Normal Peaks	46.00	44.00	46.00	44.00	46.00	44.00	46.00	44.00	46.00	44.00
Observations, Financial Peaks	56.00	54.00	56.00	54.00	56.00	54.00	56.00	54.00	56.00	54.00

Figure 3. Recession Paths under Continuous Excess Credit Treatment

Figure 3A. Advanced Countries

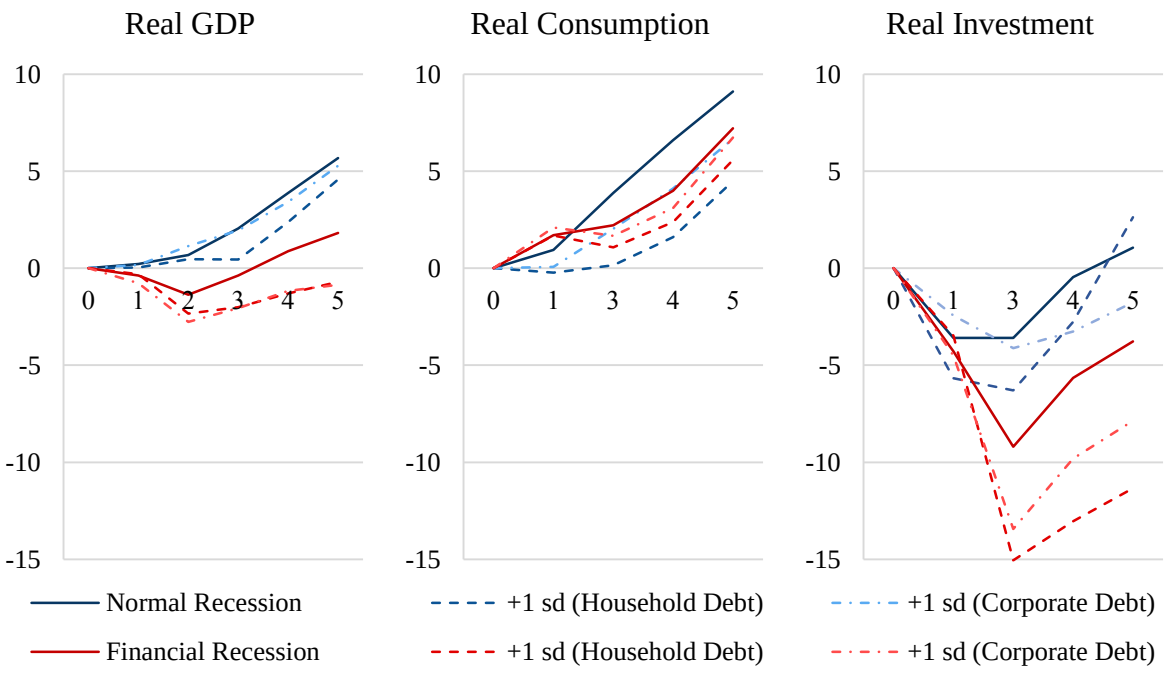
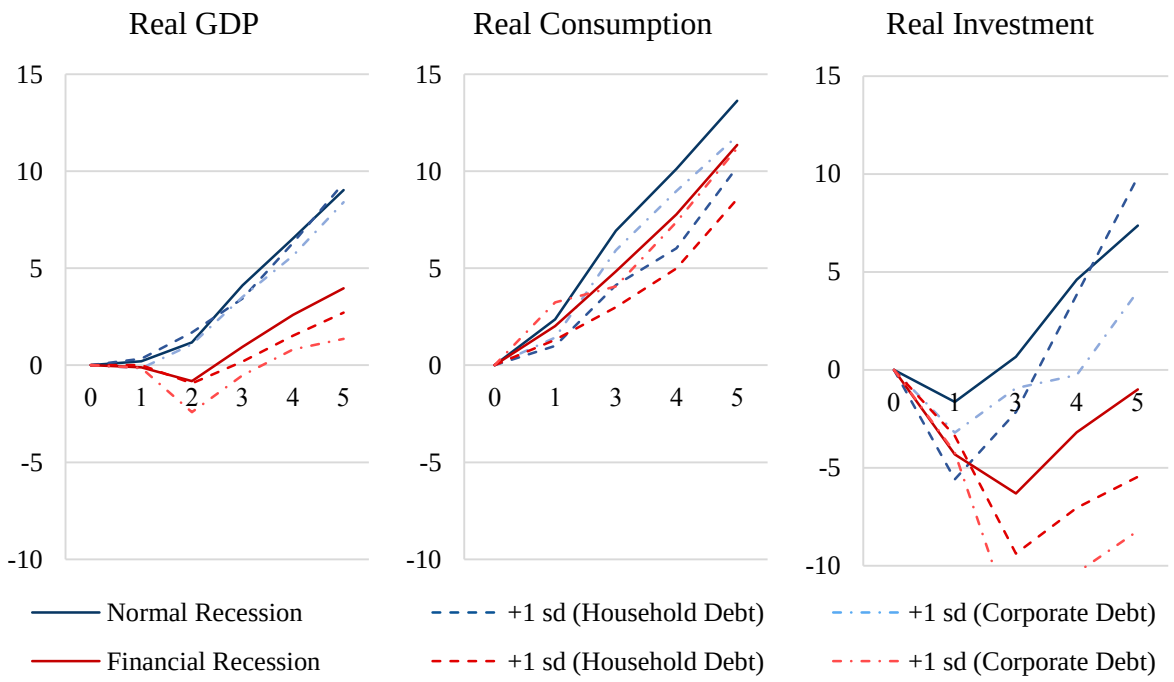


Figure 3B. Whole Countries



Findings in Table 8

- For Output, while the interaction terms with excess credits to households and corporations are not statistically significant for NPs, they are statistically significant for FPs in AEs.
- 1 SD perturbation of corporation debts places the trajectory even more below than the same shock of household debts does in EMEs.

Table 8.1.C Advanced Economies, Investment

VARIABLES										
Normal Peak	-3.594*	-3.594+	-6.268**	-6.712**	-4.314	-3.589	-2.135	-0.454	0.46	1.06
	[1.687]	[1.909]	[2.183]	[2.357]	[2.672]	[3.214]	[3.313]	[3.986]	[3.596]	[4.330]
Financial Peak	-4.413**	-4.286**	-11.55**	-11.66**	-8.310**	-9.197**	-4.808+	-5.655+	-2.688	-3.776
	[1.298]	[1.355]	[1.680]	[1.673]	[2.056]	[2.281]	[2.550]	[2.829]	[2.767]	[3.074]
Household Excess credit × Normal Peak	-1.256		-0.86		-1.199		-0.385		1.31	
	[1.111]		[1.437]		[1.759]		[2.181]		[2.368]	
Household Excess credit × Financial Peak	0.571		-2.090*		-4.083**		-4.983**		-5.239**	
	[0.783]		[1.013]		[1.239]		[1.537]		[1.668]	
Corporation Excess credit × Normal Peak		0.661		1.207		-0.299		-1.609		-1.614
		[0.804]		[0.992]		[1.353]		[1.678]		[1.823]
Corporation Excess credit × Financial Peak		-0.121		-2.299*		-2.421+		-2.374		-2.339
		[0.765]		[0.945]		[1.288]		[1.598]		[1.736]
	0.213	0.187	0.5	0.509	0.342	0.261	0.2	0.107	0.158	0.063
F-test equality of coefficients, normal = financial (p)	0.7	0.77	0.06	0.09	0.24	0.16	0.52	0.29	0.49	0.37
F-test equality of coefficients, interaction terms (p)	0.18	0.48	0.49	0.01	0.18	0.26	0.09	0.74	0.03	0.77
Observations, Normal Peaks	25	23	25	23	25	23	25	23	25	23
Observations, Financial Peaks	42	40	42	40	42	40	42	40	42	40

Table 8.2.C Whole Countries, Investment

VARIABLES	$\Delta_1 i_{it+1}$	$\Delta_1 i_{it+1}$	$\Delta_2 i_{it+2}$	$\Delta_2 i_{it+2}$	$\Delta_3 i_{it+3}$	$\Delta_3 i_{it+3}$	$\Delta_4 i_{it+4}$	$\Delta_4 i_{it+4}$	$\Delta_5 i_{it+5}$	$\Delta_5 i_{it+5}$
Normal Peak	-1.873	-1.631	-4.059+	-3.746	0.335	0.673	4.187	4.605	7.313*	7.360+
	[1.967]	[2.062]	[2.335]	[2.369]	[2.825]	[2.924]	[3.187]	[3.274]	[3.585]	[3.737]
Financial Peak	-4.339*	-4.304*	-11.13**	-10.80**	-6.357*	-6.298*	-3.358	-3.181	-1.034	-0.999
	[1.783]	[1.862]	[2.116]	[2.139]	[2.560]	[2.640]	[2.888]	[2.955]	[3.249]	[3.374]
Household Excess credit × Normal Peak	-1.988		-0.860		-1.328		-0.182		1.354	
	[1.346]		[1.598]		[1.933]		[2.181]		[2.454]	
Household Excess credit × Financial Peak	0.524		-0.552		-1.611		-1.968		-2.361	
	[0.907]		[1.076]		[1.302]		[1.469]		[1.653]	
Corporation Excess credit × Normal Peak		-0.530		0.233		-0.538		-1.637		-1.123
		[0.721]		[0.829]		[1.023]		[1.145]		[1.307]
Corporation Excess credit × Financial Peak		0.0306		-2.174+		-2.387+		-2.415		-2.433
		[1.005]		[1.155]		[1.425]		[1.596]		[1.822]
R^2	0.087	0.065	0.242	0.252	0.077	0.086	0.047	0.074	0.063	0.065
F-test equality of coefficients, normal = financial (p)	0.36	0.34	0.03	0.03	0.08	0.08	0.08	0.08	0.09	0.10
F-test equality of coefficients, interaction terms (p)	0.12	0.65	0.87	0.09	0.90	0.29	0.50	0.69	0.21	0.56
Observations, Normal Peaks	46.00	44.00	46.00	44.00	46.00	44.00	46.00	44.00	46.00	44.00
Observations, Financial Peaks	56.00	54.00	56.00	54.00	56.00	54.00	56.00	54.00	56.00	54.00

Findings in Table 8 (cont.)

- For investment, we observe clear difference between trajectories after NPs and FPs.
- Excess credits further aggravate the recession recovery, particularly after FPs.
- While the investment trajectory perturbed by 1 SD ppy increase in household debts is placed below than that perturbed by the same shock in AEs, they are placed reversely in the whole countries.

Conclusion

- We try to comprehensively understand the impact of both household and corporate debt buildups on the real economy in both AEs and EMEs.
- While the size of estimated coefficients of corporate debts are smaller, their negative impacts, as measured by one SD shock, are comparable to those of household debt buildups.

Conclusion (cont.)

- We find that more FPs are driven by corporate, rather than household, debt buildups in both AEs and EMEs.
- The impact of corporate financial recessions on output is as damaging as that of household financial recessions in AEs.
- Corporate debt buildups are particularly more painful in EMEs.